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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,834	04/05/2004	Tetsuya Osaka	0171-1074PUS1	2712

2292 7590 08/08/2005

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EXAMINER	
LEADER, WILLIAM T	

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/816,834	OSAKA ET AL.	
	Examiner	Art Unit	
	William T. Leader	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 7-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 7-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/15/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Receipt of the papers filed on March 15, 2005, is acknowledged. Included with the papers was in Information Disclosure Statement indicating that a translation of the Imai et al paper from the 26th Annual Conference on Magnetics had been submitted. However, the translation was not received.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Objections

3. Claims 1, 2, 8, 9, 12 and 13 objected to because of the following informalities: "flex density" should be --flux density--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. Claims 2 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al (6,855,240), previously cited as pregrant publication 2003/0209295, in view of the Lowenheim text *Electroplating*, Komura et al (5,575,897), newly cited, and Chen et al (6,876,507), newly cited.

5. Applicant has amended the preamble of claim 2 to recite that the method is for preparing magnetic thin film which consists essentially of 30 to 50 at% of cobalt and 50 to 70 at% of iron and has a saturation flux density of at least 2.3

T, and has amended the step of electroplating to recite a pulse current with a pulse current density of 75 to 300 mA/cm^2.

6. The Cooper et al patent is directed to a CoFe soft magnetic thin film and discloses that the thin film may be formed by electroplating. The magnetic film preferably includes between about 62% and 65% iron and between about 35% and 38% cobalt (column 6, lines 1-10). The maximum saturation magnetization is at least about 2.3 Tesla (column 5, lines 26-28) and may be between about 2.3 and 2.5 (column 6, lines 11-18). The electroplating may be performed using either an insoluble or a soluble anode. A cobalt anode is preferred as it undergoes anodic dissolution easily and does not cause substantial oxidation of the ferrous ions in solution (column 7, lines 26-30). Various electrical current versus time programs may be used in the plating, including pulsed current. The average cathodic current density may be between about 3 and 40 mA/cm^2 (column 7, lines 8-17). Cooper et al indicate that the CoFe alloy film is annealed (column 6, line 21).

7. Instant claim 2 differs from the process of Cooper et al by reciting a pulse current density of 75 to 300 mA/cm^2. As noted above, Cooper et al disclose that pulsed current may be used and that the average current density may be 40 mA/dm^2. Cooper et al are silent as to the pulse current density. The Lowenheim text teaches that electroplating follows Faraday's laws which may be stated as the equation $g = I \cdot e \cdot t / 96{,}500$ where g is the grams of substance

depositing, I is the current in amperes, e is the chemical equivalent weight and time is the time in seconds (pages 12-13). This formula shows that a higher current results in the deposition of a greater amount of material in a given period of time.

8. The Komura et al patent is directed to the production of soft magnetic films by electroplating. Komura et al show that it is known to deposit Co-Fe alloy films using pulse plating. As shown in Table 1, a pulse current density of 100 mA/cm^2 may be used.

9. Instant claim 2 additionally differs by reciting a temperature range for the heat treatment. As noted above, Cooper et al disclose that the thin film is annealed. However, Cooper et al are silent as to the range of temperatures at which annealing occurs. The Chen et al patent is directed to a thin magnetic film formed by electroplating. The film is annealed for two hours at a temperature of 245°C in an external magnetic field (column 6, lines 22-28).

10. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have used a pulse current density of 100 mA/cm^2 in the process of Cooper et al because the use of a pulse current density of 100 mA/cm^2 for the deposition of a Co-Fe alloy is known as shown by Komura et al and the use of a higher current density provides quicker deposition and increased efficiency as taught by Lowenheim, and to have annealed at a temperature of 245°C in an

external magnetic field as taught by Chen et al because the magnetic properties would have been improved . It is noted that a pulse current density of 100 mA/cm^2 is equivalent to an average current density of 40 mA/cm^2 when a duty cycle of 40% is used. The limitations of dependent claims 11-14 are suggested by the references. The concentration of cobalt and iron in the alloy disclosed by Cooper et al falls within the ranges recited in claim 11. As noted above, the saturation flux density of claims 12 and 13 is disclosed by Cooper et al, and a pulse current density of 100 mA/cm^2 is suggested by Komura et al.

11. Claims 1, 7-10, 15-20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al (6,855,240) in view of the Lowenheim text *Electroplating*, Komura et al (5,575,897) and Chen et al (6,876,507) as applied to claims 2 and 11-14 above, and further in view of Geus et al (4,869,792).

12. Claim 1 is similar to claim 2 but omits the limitation reciting an insoluble anode while reciting a cathode compartment and an anode compartment separated by a diaphragm or salt bridge. Lowenheim (page 153) and Geus et al are taken as in the previous office action. It would have been obvious at the time the invention was made to have utilized a diaphragm in the process of Cooper et al because contamination of the deposit forming on the cathode would have been avoided as taught by Lowenheim and Geus et al. In particular, Geus et al recognize that the use of a diaphragm is an alternative to the use of a soluble anode as taught by Cooper et al.

13. Dependent claims 7-10 are similar to claims 11-14. Cooper et al disclose a concentration range of iron metal ion in the electroplating bath of about 0.10 to 1.50M. This range falls within the range of 0.01 to 1.5 mol/dm^2 recited in claim 16. Similarly, the concentration ranges of claims 15 and 17 are suggested by Cooper et al. Cooper et al disclose a pH range of 2.5 to 3.5. This range falls within the range of 1 to 6 recited in claim 19. Instant claim 20 recites a cathode current density of 3 to 30 mA/cm^2. As noted above, Cooper et al disclose an average cathodic current density of between about 3 to 40 mA/cm^2 Applicant's claimed range substantially overlaps the range disclosed by Cooper et al. With respect to claims 22 and 23, Chen discloses annealing in an external magnetic field. Magnetic field strength is a result-effective variable. Choice of an appropriate value for field strength to obtain the desired results is a matter of routine experimentation.

14. Claims 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al (6,855,240) in view of the Lowenheim text *Electroplating*, Komura et al (5,575,897) and Chen et al (6,876,507) and further in view of Geus et al (4,869,792) as applied to claims 1, 7-10, 15-20, 22 and 23 above, and additionally in view of Andricacos et al (5,582,927).

15. Claim 21 additionally recites agitation by means of a rotating disk electrode. The Andricacos et al patent is directed to a process for depositing a magnetic film in the manufacture of thin film heads. Andricacos teaches that

uniform agitation is important in obtaining film with a uniform composition and that the use of a rotating disk electrode to achieve agitation is known. See column 4, line 65 to column 5, line 10). It would have been obvious at the time the invention was made to have employed a rotating disk electrode in the process of Cooper et al because agitation, which improves the uniformity of the deposited magnetic material, would have been improved as taught by Andricacos et al.

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Liao patent is directed to a high magnetic moment thin film head core and discloses the application of a magnetic field during annealing to lower the anisotropic field (column 7, lines 33-34).

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH

shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William Leader
May 23, 2005

ROY KING
SUPERVISORY PATENT EXAMINER
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